A Relation of the Return of a Great permanent Spot *in the Planet* Jupiter, *obſerved by Signor* Caſſini, *one of the Royal Pariſian Academy of the Sciences.*

'TIS now above ſix years, that Signor *Caſſini* publiſhed the Theory of two ſorts of *Spots*, at certain times to be ſeen in the Diſque of *Jupiter* *.

One ſort are nothing but the Shadows of the four Satellits, which he had often very well obſerved, when theſe Satellits, moving through the lower part of their ſmall circles that environ *Jupiter*, did paſs between him and the Sun which illuminates him, making a kind of Solar Eclipſe, like that which the Moon maketh, when ſhe is between the Sun and the Earth. Theſe Spots, as he obſerved from that time, have this peculiar, which diſtinguiſheth them from all others, *that* they are preciſely found in that place of *Jupiter*, where ſome Satellit is ſeen by the Sun; *that* they go from the Oriental limb to the Occidental of the Diſque of *Jupiter* with a motion alwaies equal to that of the Satellit; *that* in reſpect to us they preceed the Satellit before the oppoſition of Jupiter to the Sun, and follow him after the oppoſition; *that* the further Jupiter is diſtant from the oppoſition, the greater is the apparent diſtance of the ſame Satellit; *that* at divers times of the Year this diſtance changeth in proportion of the annual Parallax of the Satellit, according as he is differently ſeen by the Sun and by the Earth; and *that* at one and the ſame time of the year, when divers Satellits happen to be between Jupiter and the Sun, the Spots correſpondent to them are diſtant from them in proportion of the ſemi-diameters of the circles of the ſame Satellits.

The *other* ſort of Spots have no dependance at all from the Satellits; but it ſeems, that they have ſome reſemblance to thoſe Spots that ſometimes appear in the Sun, or to thoſe that are alwaies ſeen in the Moon; and they are perhaps of the ſame nature with thoſe, that are called *Belts*. Theſe Spots do alſo move from the Eaſtern to the Weſtern limb of *Jupiter's* diſque; but their apparent motion is unequal, and ſwifter near the Center than the Circumference; and they never are ſo well ſeen as when they approach to the Center, they being very narrow and almoſt imperceptible, when they approach to the Circumference: which makes us believe, that they are flat, and ſuperficial to *Jupiter*.

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* *What was diſcovered of the* permanent *Spot in this Planet here in* England *by M.* Hook *An.*1664.*in* May, *may be ſeen* N°.1.*p*.3. *compared with* N°.4.*p*.75. N°.8.*p*.143.N°.12.*p*.209.N°.15.*p*.246.

Among theſe Spots of the ſecond ſort there is none ſo ſenſible, as one that is ſcituate between the two Belts, which in the diſque of *Jupiter* are ordinarily ſeen extended from eaſt to weſt; the largeſt of which is between the Center and the Northern limb, and the narroweſt is beyond the Center toward the Southern limb. This Spot is alwaies adhering to the *Southern Belt*; its diameter is about the tenth part of that of *Jupiter*; and at the time that its center is neareſt to that of *Jupiter*, it is diſtant from it about the third part of the ſemi-diameter of that Planet.

Signor *Caſſini*, after he had made many Obſervations of this Spot during the Summer of the year 1665, found, that the period of its apparent revolution is of *nine hours* and *fifty ſix minutes*; and having taken an *Epocha* of the time, when it arrived at the middle of the Belt, he calculated *Tables* and *Ephemerids* of its motion for the end of the ſaid year 1665, and for the beginning of 1666. He continued to obſerve it until the beginning of 1666, when *Jupiter* approached to the beams of the Sun; and the Obſervations were found conform enough to his Ephemerids. But after it was got free of the ſun-beams, this Spot was difficult to be diſcerned: And as this gave ground to believe, that it might be of the nature of the Spots of the Sun, which, after having appeared for a while, diſappear for ever, Signor *Caſſini* ceaſed at length to obſerve them.

But *Jan.* 19. of this preſent year 1672. (ſt. n.) when he obſerved *Jupiter* at 4¾ a clock in the morning, he perceived in the ſame place of his diſque the Figure of the ſame Spot, adhering to the ſame *Southern Belt*. It was already gone beyond the moiety of this Belt, and he ſaw it advance little by little towards the Weſtern limb, to which it ſeemed to be very near at 6¼ a clock: But it then appeared ſo ſmall and little, and ſo little ſenſible, that he was obliged to ceaſe from obſerving it.

By the Celerity of its motion near the Center, and by the place where he had begun to ſee it, he judged, that it might have been in the midſt of the *Belt* at 4 a clock and 35 min. in the morning: And as he prepared himſelf to make *Ephemerides* of its motion for this preſent year 1672, he perceived, that in thoſe, he had made for the year 1666, by good luck, this Spot had been in the midſt of *Jupiter* the ſame day, namely the

the 19*th* of *January* at the ſame hour in the morning, the reduction of hours being made by the difference of the *Meridians*. So that by the calcul he made, in ſix years, of which one is a *Biſſextile*, it is found to have made, in reſpect of the Earth, at leaſt 5294 revolutions, each of 9 hours 55 minutes, 58 ſeconds, compenſating one revolution by another; and at moſt 5295 revolutions of 9 hours, 55 minutes, 51 ſeconds; foraſmuch as he was aſſured of the preciſeneſs of one *Mean* Revolution to one eight of a minute: which will be verified by future obſervations. Thus the *Ephemerides* were found ready made for the firſt months of this preſent year, but only that we are a little differently to apply the Equations, that amount to ſome minutes, becauſe that the diſtance, which *Jupiter* now is at from the Sun and from his Apogee, is different from that, which he was at in the beginning of the year 1666; and that in this preſent year after the month of *February*, that day is to be counted which hath been added for the *Biſ-ſextile*. The Obſervations, which Signor *Caſſini* hath continued to make ſince the 19*th* of *January*, as far as the weather did permit, have alwaies been found conform to thoſe *Ephemerides*.

Until then he had never yet ſeen an *immediate* return of this Spot after 9 hours and 56 minutes, becauſe it had not hapned, that *Jupiter* after the apparition of the Spot had ſtay'd, in one and the ſame night, long enough above the Horizon, at leaſt at a ſufficient height to obſerve him with due diſtinctneſs. He had only concluded the time of this revolution by returns obſerved after about 20, 30, and 50 hours; and he had more preciſely limited it by obſervations more diſtant. But the night after the 1 day of *March*, at $7\frac{1}{2}$ a clock in the evening, he ſaw this Spot in the midſt of the Belt; and the ſame night, at 5 a clock and 26 minutes in the morning, he ſaw it again returned preciſely to the ſame place. Next day he made a report of theſe Obſervations to the *R. Academy of the Sciences*, and predicted, that the Spot would arrive again at the midſt of the Belt *March* 3*d* at 9 a clock and 8 minutes at night, whereupon that Aſſembly deputed M. *Buot* and M. *Mariotte* to be preſent at the Obſervation; who being come to the *R. Obſervatory* began to ſee at 8 a clock and 4 minutes the Spot already ſomewhat removed from the Oriental limb, but yet obſcure and ſmall. At 8 a clock and 47 minutes they ſaw it very diſtinctly advancing towards the middle of the Belt. From 9 a clock 5 minutes and 40 ſeconds,untill 9 a clock and 8 minutes,they ſaw it in the midſt of the Belt. At 9 a clock and 15 minutes it was paſſed the middle,and was come nearer to the Occidental limb. And a little after the Heavens being over caſt, he could then obſerve it no further.

This Obſervation being taken for the *Epocha*, it is eaſie to find hereafter the times,when this Spot ſhall return to the midſt of the Belt. For you are only to add alwaies 9 hours and 56 minutes,and,for greater preciſenes's ſake,not to omit the ordinary Equation of days,that depends from the inequality of the motion of the Sun in reſpect of the Equinoctial, nor the particular Equation, that depends from the inequality of the motion of *Jupiter* according to the diverſity of the diſtance of the Sun and his Apogee.

This Revolution being the ſwifteſt and the moſt regular that is hitherto known in the Heavens, a Travellour alone, even without having any correſpondence with other Obſervers, may make uſe of it to find the *Longitudes* of the moſt remote places of the Earth We ſhall hereafter examine, to what preciſeneſs we may arrive by this way.

Obſervations of a New Comet,*made at* Paris *in the Royal Obſervatory by Signor* Caſſini.

THere now appears a Comet,which ſeems to be near the end of his Appearance,and which might have been ſeen above a month ſince, if the weather had been favourable. But he being very ſmall,and having been a long while obſerved by the beams of the Sun,to which he was nigh, and afterwards by the Moon,which was greatly advanced in her light, beſides that the Heavens in theſe parts have often been over-caſt, we have not obſerved him but lately.

The Mathematicians of *la Fleſche* perceived him from the 16 of March, and gave us here at *Paris* the firſt notice of it. Thoſe of the College of *Clermont* being advertiſed of it, ſaw him the 25*th* of the ſame month. And upon notice given of it to the *R. Academy of the Sciences* by *P. Pardies*, Profeſſor of the Mathematicks in the College of *Clermont*, Signor *Caſſini* hath ever ſince been obſerving him as much as the weather did permit